

### **REMARKS**

#### **Disposition of Claim**

Claims 26-53 are currently pending.

#### **Claim Amendments**

Claims 26 and 53 are amended to correct obvious typographical errors.

#### **Priority**

This application is the U.S. National Stage of International Application No. PCT/EP2003/010904, filed October 2, 2003, published in German, and claims priority under 35 U.S.C. § 119 or 365 to German Application No. 102 46 373.5, filed October 4, 2002.

#### **Claim Objections**

The Examiner objected to Claims 26 and 53 because these claims contained crossed out words "aids".

Claims 26 and 53 have been amended to correct these obvious typographical errors.

#### **Rejection of Claims Under 35 U.S.C. § 102**

##### *Examiner's Position*

The Examiner maintained the rejection Claims 26-29, 31, 35-37, 41-44 and 46-52 under 35 U.S.C. § 102(b) as being anticipated by US Patent Publication 2004/0062969 ("Sakaguchi") as evidenced by "Polyphosphoric Acid Assay" ("Innophos").

The Examiner's legal position is based in the theory of inherency or, in the alternative, as a "102/103" rejection (Office Action, page 5).

The Examiner maintained the assertion that Sakaguchi teaches the steps A) through E) of base Claims 26, 48 and 51, but does not expressly teach step F), partial hydrolysis of the polyphosphoric acid. The Examiner stated that the polyphosphoric acid moieties of the membranes of Sakaguchi are expected to inherently partially hydrolyze, thus resulting in the same product as the one claimed by the instant claims. The Examiner referred to paragraphs [0210] and [0254]-[0260] of Sakaguchi, and further relied on "Polyphosphoric Acid Assay"

("Innophos"), for its teaching that the polyphosphoric acid is hygroscopic and, therefore, is subject to partial hydrolysis under atmospheric conditions.

The Examiner required Applicants to provide evidence that the prior art products do not necessarily possess the characteristics of the claimed product (Office Action, page 6). In response to the previously submitted arguments, the Examiner asserted that Applicants did not show convincing proof of the complete removal of polyphosphoric acid from the membranes of Sakaguchi and maintained that the polyphosphoric acid is inherently present in the membranes of Sakaguchi (Office Action, pages 10-19).

#### *Applicants' Position*

Applicants disagree with the Examiner's arguments and conclusions and recapitulate their legal position.

Sakaguchi does *not* inherently teach all the steps of Applicants' base claims because the disclosure of Sakaguchi, including paragraphs [0210] and [0254]-[0260], fails to teach partial hydrolysis. Specifically, the referenced paragraphs of Sakaguchi teach *complete removal*, not partial hydrolysis, of the polyphosphoric acid moieties, as required by base Claims Claims 26, 48, 51 and 53. For example, paragraph [0255] expressly states:

After completing the polymerization, the mixture was allowed to cool, poured into water, and the polymer obtained was repeatedly rinsed in a blender until pH test paper was neutralized. (*Emphasis added.*)

Because the pH is *neutral*, based on this description alone it is clear that polyphosphoric acid was *completely removed*. Therefore, the resulting product of Sakaguchi is by necessity very different from the product of a process recited by pending Claims Claims 26, 48, 51 and 53: no polyphosphoric acid is present in the membranes of Sakaguchi, while polyphosphoric acid *is* present in the Applicants' claimed product.

*(1) Examiner's Position is Technically Incorrect*

Applicants argued that after “repeatedly [being] rinsed in a blender until pH test paper was neutralized”, the polymer of Sakaguchi contains *no detectable polyphosphoric acid*. In support of this argument, Applicants previously submitted Exhibits A and B<sup>1</sup>. Exhibit A is a Material Safety Data Sheet for polyphosphoric acid (manufactured by SM Chemicals, India). Exhibit B is a Safety Data Sheet for orthophosphoric acid manufactured by OM Group Ultra Pure Chemicals Ltd, UK. Exhibit A, section 9 (page 2), states that polyphosphoric acid is *completely* soluble in water, with the formation of orthophosphoric acid. In other words, Exhibit A indicates that repeated removal of used water and addition of fresh water (*i.e.* “repeated rinsing” of Sakaguchi) will *completely* dissolve (*i.e.* remove) polyphosphoric acid, and that the product of such dissolution would be orthophosphoric acid. Exhibit B, states in section 9 (page 3), that orthophosphoric acid is miscible in water in *all proportions*. In other words, as soon as it is formed by the hydrolysis of polyphosphoric acid, orthophosphoric acid would be immediately and completely removed by water.

Accordingly, the process employed by Sakaguchi will result in *complete* removal of polyphosphoric acid and the products of its hydrolysis. While it is possible that *individual molecules* of either the polyphosphoric acid or the orthophosphoric acids may remain within the polymer of Sakaguchi, the concentration of such products will be below the limit of detection, as evidenced by the pH paper turning “neutral” in the procedure described by Sakaguchi<sup>2</sup>. Such a product is certainly different from the product defined by Applicants’ base claims, which recite that polyphosphoric acid was only *partially hydrolyzed*, *i.e.* that some *detectable* amount of polyphosphoric acid remains present in the membrane.

Applicants also submit that the Examiner’s stated position that “some of the polyphosphoric acid would remain in the polymerized product”<sup>3</sup> are scientifically unfalsifiable. An unfalsifiable statement cannot form a basis of a technical assertion and, therefore, cannot form a basis for claim rejection based on prior references.

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<sup>1</sup> See Amendment filed on March 23, 2009.

<sup>2</sup> Sakaguchi, paragraph [0255], also quoted above.

<sup>3</sup> Office Action, page 11.

*(2) Examiner's Position is Legally Incorrect*

Applicants' base claims are drawn in the process-by-product format. The Examiner's rejection of these claims is based on theoretical presence in the membranes of Sakaguchi of undetectably low amount of an ingredient. However, the proper inquiry into patentability of a product-by-process claims is whether the *material differences* between the Applicants' products and those of Sakaguchi exist. The undetectably low amount of an ingredient, even if present, would not bridge the gap in physical properties and, therefore would not eliminate material differences, between the membranes of Sakaguchi and those of Applicants.

M.P.E.P. §2113 states regarding product-by-process claims:

The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art [...] (*Emphasis added.*)

Applicants previously cited the case of *In re Garnero*, 412 F.2d 276, 162 USPQ 221 (CCPA 1969), which is quoted in M.P.E.P. §2113. In *In re Garnero*, the court gave clear guidelines for examination of a product-by-process claim:

The correct inquiry [...] is whether the product defined by claim 1 is patentably distinguishable over the [*cited references*] in view of the structural limitation [...] (412 F.2d 276 at 279) (*Emphasis added.*)

In the instant case, *the presence of polyphosphoric acid within the membrane* is one of the elements of Applicants' invention. It is a "structural limitation" of the inventions defined by the pending claims and it provides for "material differences" between Applicants' claimed invention and the membranes of Sakaguchi.

In the membranes of Sakaguchi the polyphosphoric acid or the orthophosphoric acids, even if theoretically present, are expected to be below the limit of detection<sup>4</sup>. In contrast, Applicants' claimed membranes include polyphosphoric acid. Furthermore, Applicants teach that the partial hydrolysis of polyphosphoric acid leads to strengthening the membrane and to decrease in the layer thickness (page 35, lines 22-26 of the English translation of the instant specification *and the recitation, in step (F) of the base claims, that the membrane is self-*

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<sup>4</sup> Evidence presented by Applicants (paragraphs [0254]-[0260] of Sakaguchi in view of Exhibits A and B).

*supporting*<sup>5</sup>). Applicants further teach that the degree of hydrolysis of polyphosphoric acid permits control over the conductivity of the membrane (page 37, lines 6-14). Therefore, the “structural limitations” “implied by the process steps” of Applicants’ base claims result, with necessity, in a product different from that disclosed in Sakaguchi.

Moreover, Applicants note that the teachings of Sakaguchi direct one of ordinary skill in the art *away* from raising the concentration of phosphoric acid above the limit of detection. Indeed, one of the stated objectives of Sakaguchi’s invention is to provide “ion conductivity by introducing sulfonic acid groups or phosphoric acid groups into a polybenzazole compound” (Sakaguchi, paragraph [0021]). Sakaguchi further states that the “ion conductivity” of his membranes are due to the presence of phosphonic acid groups and sulfonic acid groups (Sakaguchi, paragraph [0122]). Thus, when Sakaguchi performs ion conductivity measurements, such as in Example 1 (Sakaguchi, paragraph [0259]), the presence of *additional* ion conductor, such as phosphoric acid, would be *undesirable*, as it would distort the measurements by inflating the value of conductivity. Accordingly, one of ordinary skill in the art would not, based on the teachings of Sakaguchi, raise the concentration of phosphoric acid above the limit of detection.

In view of the foregoing, reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b) are respectfully requested.

#### Rejection of Claim 53 Under 35 U.S.C. § 103(a)

The Examiner rejected Claim 53 as being unpatentable under 35 U.S.C. §103(a) over Sakaguchi in view of WO 2004/024797 (“Kiefer”).

#### *(1) Kiefer is not available as prior art against the presently claimed invention*

Kiefer is not available as prior art against the instant application. This application is the U.S. National Stage of International Application No. PCT/EP2003/010904, filed October 2, 2003. As such, its “filing date” is the international filing date of October 2, 2003. Kiefer is a publication of an International Application PCT/EP2003/009020, published in German on March 25, 2004. Because Kiefer was *not* published in English, it does not have a “102(e) date” and,

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<sup>5</sup> The Examiner is directed at the description of the “self-supporting” membranes page 36, lines 1-2 and on page 37, lines 1-3.

therefore, is not a reference under 35 U.S.C. §102(e). Because Kiefer's international publication date is after the "filing date" of the instant application, Kiefer is not a "102(a)" art. The first page of Kiefer is enclosed herewith as Exhibit 1.

As such, the instant rejection is improper and should be withdrawn.

*(2) Claim 53 is novel and non-obvious over Sakaguchi*

In addition to the reasons presented above (material differences between the claimed products and the products of Sakaguchi due to partial hydrolysis rather than complete removal of polyphosphoric acid), Claim 53 is patentable over Sakaguchi for yet another reason.

Sakaguchi does not teach that the concentration of phosphoric acid in the membrane is from 10 to 80 mols of phosphoric acid per mol of a repeating unit of the polyazole polymer, as recited in new Claim 53. The presence of phosphoric acid in the recited range, however, confers unexpected advantages onto the Applicants' membranes, as stated above: improved mechanical strength and control over the conductivity of the membranes.

It is thus established that the process of Sakaguchi (polyphosphoric acid is removed) is different from the process of the instant base claims (polyphosphoric acid is retained, partially hydrolyzed). The difference between the products obtained by these different processes follows with necessity: the membranes of Sakaguchi do *not* contain polyphosphoric acid, while the membranes of Claim 53 *does* contain such moieties.

Reconsideration and withdrawal of the rejection are requested.

Rejection of Claims 30, 32-34, 38-40, 45 and 46 Under 35 U.S.C. § 103

Dependent Claims 30, 32-34, 38-40, 45 and 46 are rejected over a combination of Sakaguchi in view of Matsuoka, Gerber, Nakao, Akita or Kerres, previously of record. Applicants respectfully disagree.

Sakaguchi is discussed in detail above. Sakaguchi does not teach or suggest the membranes having polyphosphoric acid moieties.

The secondary references each teach polymers made up of monomer units that may be used in the present invention, but do not teach or suggest membranes with partially hydrolyzed

polyphosphoric acid moieties. Therefore, none of the deficiencies of Sakaguchi are overcome by the combination of references.

Reconsideration and withdrawal of these rejections are respectfully requested.

**CONCLUSIONS**

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue.

If the Examiner feels that a telephone conference would expedite prosecution of this application, she is invited to call the undersigned.

Respectfully submitted,

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